



The Masked Avengers: Bioscience Division teams up with a New Mexico small business to test antibacterial face masks

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Around the country scientists and business leaders are thinking creatively about out-of-the-box ways to tackle the coronavirus, but closer to home a former Los Alamos National Laboratory chemist and a Bioscience Division staff member are applying known concepts to the simple face mask, with great effect.

Gary Selwyn, formerly in the Physics Division at Los Alamos, now has a company in Rio Rancho, Green Theme Technologies, Inc., which is an independent developer of chemical technology for dry finishing of textiles, nonwovens and footwear. While seeking to develop a face mask that could not only block, but kill both bacteria and viruses, Selwyn needed to have the antibacterial and antiviral assessments done independently, and he reached out to the New Mexico Small Business Assistance (NMSBA) program.

Knowing who to call

An NMSBA coordinator connected Selwyn with Laverne Gallegos-Graves of the Bioenergy and Biome Sciences group at Los Alamos to test the antibacterial properties, while staff at University of New Mexico handled the viral work.

“All of the bacterial work was complete at the Health Research Laboratory in Bioscience division,” Gallegos-Graves said. “The work capitalized on our expertise in microbiology and benefited from experience we gained through national security and U.S. Department of Energy Office of Science projects over the years.”

In the Green Themes Technologies NMSBA project, Gallegos-Graves said, “we evaluated sponsor-provided fabrics for their antibacterial properties using industry-standard protocols. We tested multiple fabrics that had various treatments and identified the most effective treatment.”

To measure the actual effectiveness of a particular treatment and fabric combination, she said, the testing protocol measured declines in the abundance of a bacterium after incubation on a fabric for a period of time that is relevant to expected usage.

Step by step, inch by inch

The testing occurred in phases. “First, we measured the efficacy of a suite of potential antibacterial coatings on fabric to understand the types of chemistries that would be effective and to down-select a couple of promising candidates,” Gallegos-Graves said.

“Second, we performed time trials with the most promising candidates to assess performance in different use-case scenarios, for example one hour versus several hours of wear,” she said.

Finally, the Los Alamos team tested the effect of multiple wash cycles on the antibacterial efficacy of the most effective candidate to confirm that the coated fabric would offer protection even after a customer washes the fabric multiple times for repeated use.

The company and its advisors settled on a combination of thymol, a natural oil derived from the thyme plant, and a compound of quaternary ammonium, commonly used in detergents and fabric softeners. The mask material and its coating stood up to at least 10 washes with continued effectiveness, she said.

“This work demonstrates how small business and the national labs can work together and pool resources to solve issues of national need even at a time of emergency and provide products to address that national need,” said Selwyn, Green Theme Technologies founder.

Selwyn’s company’s work on the product is not done yet, however—FDA approval needs to come next on the antiviral aspect, although the masks in disposable and fabric models will be on the market soon, sold initially with the antibacterial notation.

This coater puts antibacterial chemistry onto large rolls of fabric.

The rolls are coated and inserted into this pressure pod. After the fabric heats and cures, it’s coated with a polymer surface.

Los Alamos National Laboratory

www.lanl.gov

(505) 667-7000

Los Alamos, NM

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